

29. A method according to claim 28 wherein prior to said summing, the baseline of at least one optical response signature is adjusted.

30. A method according to claim 28 wherein the signal-to-noise ratio is increased by a factor of at least 10.

31. The method of claim 28 wherein an analyte detection limit is reduced by a factor of at least 100.

*Sub C* 32. The method of claim 28 wherein said sensor array comprises a population of beads dispersed on a substrate.

33. The method of claim 32 wherein said substrate is a fiber optic bundle.

*A* 34. The method of claim 32 further comprising identifying the location of each sensor element within each sensor subpopulation within the array.

35. The method according to claim 28 wherein said sensor elements comprise chemical functional groups.

*A1* 36. The method according to claim 28 wherein said sensor elements comprise oligonucleotides.

*Sub B2* 37. A method for amplifying the characteristic optical response signature of a sensor array having subpopulations of sensor elements comprising:

- measuring the optical response signature of at least two of said sensor elements of at least one of said subpopulations; and
- summing the optical response signatures.

38. A method according to claim 37 wherein prior to said summing, the baseline of at least one optical response signature is adjusted.--